

Broadband Vector Vortices for High Contrast Coronagraphy, Phase I



Completed Technology Project (2018 - 2019)

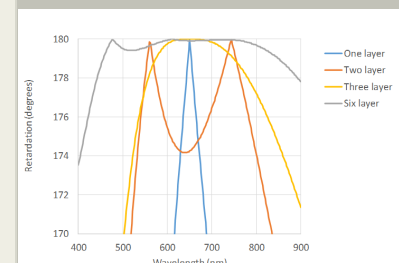
Project Introduction

Vector vortex waveplates (VVs) have been shown to be useful for coronagraphy and other applications requiring proximity glare suppression. BEAM Co. has been on the forefront of development of VVs for such applications, and is well-positioned to apply past experience to extending this technology into new regions of the spectrum, including the ultraviolet, and to make it possible to achieve high contrast in coronagraphy over broader wavelength bands than has to date been possible. Materials already proven to enable proximity glare suppression in the visible are readily adaptable to the UV at least down to 300 nm wavelength, and further material development should allow glare suppression for even shorter wavelengths. Multilayer liquid crystal polymer structures are expected to allow broadening of the spectral bandwidth over which high contrast is provided from 10% of the center wavelength to at least 20% of bandwidth. The design techniques to be developed under the program for new wavelength bands, and for broader operational bandwidths, are applicable to a wide range of diffractive waveplate devices in addition to VVs, and to additional applications, including design of diffraction gratings for spectrometry, and design of telescopes based on diffractive waveplate structures.

Anticipated Benefits

NASA applications for the results of our program include coronagraphy and other astronomical applications requiring proximity glare suppression. Other potential applications include the use of the developed structures for elements of ground-based and spaceborne telescopes for astronomical observations and for optical communications.

Non-NASA applications include coronagraphy, spectrometry, telescope design, and optical communications.



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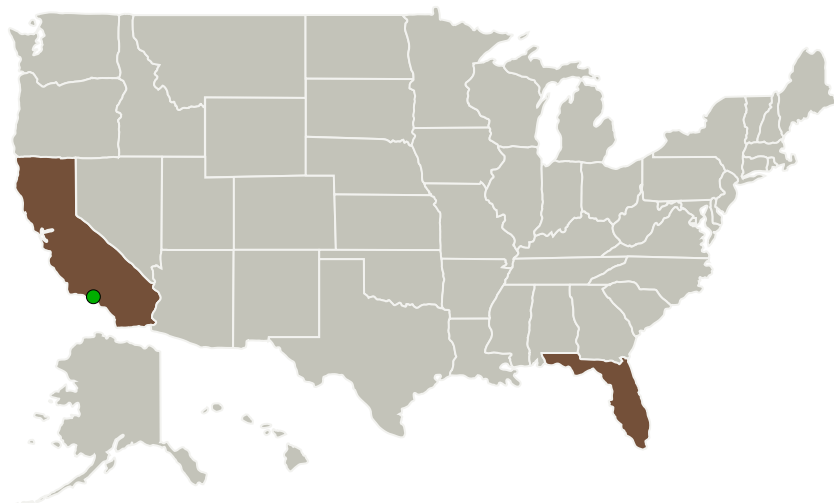
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
BeamCo	Lead Organization	Industry Women-Owned Small Business (WOSB)	
● Jet Propulsion Laboratory (JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Florida
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Project Transitions

**July 2018:** Project Start**February 2019:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140954>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

BeamCo

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Nelson Tabirian

Co-Investigator:

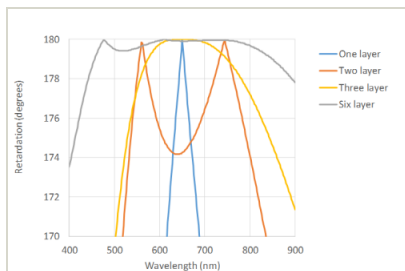
David L Roberts

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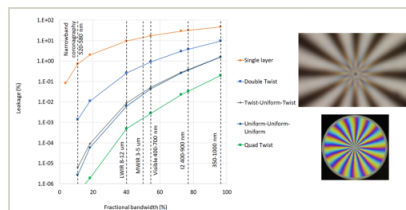


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Images

**Briefing Chart Image**

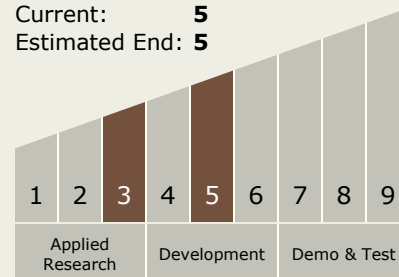
Broadband Vector Vortices for High Contrast Coronagraphy, Phase I
(<https://techport.nasa.gov/image/132140>)

**Final Summary Chart Image**

Broadband Vector Vortices for High Contrast Coronagraphy, Phase I
(<https://techport.nasa.gov/image/134568>)

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.1 Remote Sensing Instruments/Sensors
 - TX08.1.3 Optical Components

Target Destination

The Sun